Amendments to the Specification

Please replace the paragraph at page 21, line 15, through page 22, line 7, with the following amended paragraph:

Shaped field winding patterns for the drive winding can be created in a variety of geometries. As an example, FIG. 4 shows windings comprised of rectangular loops for a ~~cartesian~~ Cartesian coordinate pattern. Terminal connections to these loops are made through the wires 23. The number of turns in each segment 22, denoted by the capital letters A through K, is varied so that the shape of the cross-sectional current distribution in the y direction can be adjusted as necessary. Continuity of the current is maintained with the side connections 20. These side connections are typically placed far enough apart so that no variations in the x direction need to be considered when modeling the sensor response. An example winding current distribution designed to excite a singular Fourier mode for the magnetic field is illustrated in FIG. 8. For each segment, the sign for each value indicates the current direction while the integer indicates the number of conducting segments or relative current magnitude. Another example is the rotationally symmetric cylindrical geometry FIG. 5, where the number of turns in each circular winding segment 30 is varied to shape the field. Interconnections between each segment are made with tightly wound conductor pairs 32 to minimize fringing field effects. A GMR sensor 34, with feedback controlled coil, is placed at the center of the concentric circular drive windings. Sensor 34 may also be a coil, a SQUID sensor, or a Hall effect sensor. Connections to this ~~hybrid~~ sensing element are made with a tightly wound conductor pair 36. Both the number of turns and the polarity of the windings (current direction) can be varied in the drive winding segments. In this case, there are two sets of drive windings (31 and 33) which allows more than one fundamental spatial mode. As described later, the polarity of the connection 32 determines which of the two current drive patterns (with different fundamental spatial wavelengths) is excited. This provides two distinct field depth of penetration conditions and permits improved multiple property measurements for layered media. The test material 35 can be a substrate 39 having a magnetizable foam layer 37 of known thickness. An example winding distribution designed to excite a singular Fourier-Bessel mode for the magnetic field is illustrated in FIG. 9.

Please replace the Abstract at page 59, lines 5 through 22, with the following paragraph:

Magnetic field sensor probes are disclosed which comprise primary or drive windings having a plurality of current carrying segments. The relative magnitude and direction of current in each segment are adjusted so that the resulting interrogating magnetic field follows a desired spatial distribution. By changing the current in each segment, more than one spatial distribution for the magnetic field can be imposed within the same sensor footprint. Example envelopes for the current distributions approximate a sinusoid in Cartesian coordinates or a first-order Bessel function in polar coordinates. One or more sensing elements are used to determine the response of a test material to the magnetic field. These sense elements can be configured into linear or circumferential arrays.

Attachment: Replacement Sheet